

FINAL
(5/2/2002)

MEETING REPORT

MOAB MILLSITE GROUNDWATER SUBCOMMITTEE
DOE Grand Junction Project Office
8:30A-4:30P, April 16, 2002

Meeting Attendees

Loren Morton, Utah Department of Environmental Quality
Paul Mushovic, U.S. Environmental Protection Agency–Region 8
Joel Berwick, Department of Energy-Grand Junction Project Office (DOE-GJO)
Don Metzler, DOE-GJO
Audrey Berry, DOE-GJO
Tracy Plessinger, DOE-GJO
Harvey Merrell, Stakeholder
Max W. Young, Utah State Representative
Bruce Waddell, U.S. Fish & Wildlife Service
Ken Karp, MACTEC-ERS
John Elmer, MACTEC-ERS
Pete Penoyer, National Park Service (NPS)
Dan Kimball, NPS

DOE General Report

At the outset of the meeting, DOE provided a general update on the Moab Millsite Project. At this point in time, the DOE Grand Junction Project Office plans to submit a Plan for Remediation to DOE Headquarters by September 30, 2002. This report will contain a recommendation to either cap-in-place or relocate the tailings. The National Academy of Sciences (NAS) report is expected in June, 2002. In concert with the Relocation Committee, DOE has been refining cost estimates for rail haul to Klondike Flats, evaluating the use of slurry lines and a conveyor, and assessing transport on State Highway 191. DOE has also been carrying out a risk assessment of the cap-in-place alternative (considering exposure from an industrial safety standpoint). In terms of site activities, DOE has constructed a lined pond in which to discharge tailings dewater and has applied calcium chloride to the pile to reduce dust. (It was noted that on April 15, some problems with dust emissions from the site from an excavated area North of the pile were observed. DOE-GJO plans to apply more surfactant in this area to control the problem.)

The FY2002 budget for the site is \$4.5M (\$2M projects funds, \$1.8M carry-over from FY2001, and \$700K LTSM [Long-Term Surveillance & Maintenance]). The proposed FY2003 budget is \$1.596M (\$966K project funds and \$630K LTSM). With this level of funding for FY2002 and FY2003, DOE will be able to carry out the Initial Remediation

Action (discussed below). Funds will be sufficient to complete the design of the Interim Remediation Action (discussed below), but insufficient to implement the Interim Remediation Action (e.g., in terms of installing interception wells and a lined evaporation pond). At this point in time, DOE's FY2004 request for the site is \$7.7M (sufficient to cover full implementation of the Interim Action).

The administrative process following the September 30 recommendation to DOE Headquarters (e.g., with respect to the development of a final Remediation Action Plan, EIS, Final DOE decision, etc.) has not yet been defined. A briefing for Jessie Roberson, Assistant Secretary of Environmental Management for DOE, on the Moab Millsite Project is planned for May 2 in Washington, D.C.; as such, clarification on this process may be available after that date.

Review of DOE Implementation Plan for Initial Remediation Action (Freshwater Application)

Don Metzler and Ken Karp presented DOE's implementation plan for the Initial Remediation Action. The plan includes pumping water from the river upstream and then applying it to the backwater areas to reduce elevated ammonia concentrations that are adversely affecting fish. DOE recognizes this is not a permanent fix and is experimental in nature (since to anyone's knowledge this has not been tried before). A maximum of 1,360 gpm will be pumped from the river; based on a qualitative approach, DOE's engineers believe this is enough water to dilute the high concentrations of ammonia in backwater areas to acceptable levels. However, this 1,360 gpm flow rate was based solely on 80% of the maximum pumping capacity of the portable diesel-powered pump. Water will be piped approximately 1,200 feet along the shoreline and discharged to three backwater areas via three laterals with discharge devices (e.g., fabric socks, porous tip PVC heads, well screens, etc. that are currently being investigated). It was agreed that care must be taken to avoid disturbance of sediments in the bottom of the backwater habitat areas in that ammonia has likely accumulated there; disturbance of these sediments could re-suspend ammonia and make the problem worse.

It was agreed that any increase in water temperature in the pipeline would be nominal. FWS believes that, overall, the action is positive and is attempting to eliminate a known hazard, but cautions that there are many unknowns involved. In particular, the U.S. Fish & Wildlife Service (FWS) notes that a major challenge of the selected action will be to not change the physical character of backwater areas (e.g., as noted above). It is expected that FWS will have minor comments on the action, and May 1st is the target date for FWS concurrence.

The optimal habitat for the backwater area for larval and young of the year pikeminnow is a water depth of 6 inches to 2 feet. As such, this depth (and associated flow regime) will determine when the remediation action will start. Below about 4,000-5,000 cfs, the backwater habitat dries up; at flows higher than about 10,000-14,000 cfs, the backwater area is flooded. Based on this year's hydrograph, the peak is expected in the May 28 to June 1 timeframe, and the action could be implemented very soon after that. According

to FWS, the critical window for backwater use by endangered fish is mid-June to August. As such, duration of the action is expected to be 1 to 3 months in length (depending on flows).

FWS indicated that while the summer, when larval fish are entrained into these backwaters, is the most critical time of the year, backwater habitat exists during other times of the year as well (e.g., when the USGS bioassays were conducted in February), and conditions have been found to be lethal to fish in certain situations. FWS believes that water conditions dictate when habitat exists and to some extent when spawning occurs. For pikeminnow, normally July through September (or even October) should be considered during this early window if river flows maintain backwaters. FWS indicated that June would also be appropriate for razorback larvae if backwater conditions exist.

Mike Hudson (Utah Division of Wildlife Resources-Moab) and local FWS staff will be consulted as the initial action progresses (especially during the start-up phase of the action). Termination of pumping will not be done without consultation with Mike Hudson and FWS staff. DOE will assure that appropriate NEPA compliance is carried out with respect to this action.

It was agreed that at lower river stages that a greater proportion of the water in the backwater areas would be derived from groundwater baseflow. Consequently, additional freshwater pumpage may be required to dilute the backwater habitat areas at lower river stage.

The intake structure for the upstream pump will be installed out in the river's channel, about 20-30 feet. This intake structure will be about 2 feet in diameter by 3 feet long and will be staked to the river bottom. DOE agreed to conduct specific conductance (SC) monitoring of the intake water in the field to ensure that water pumped is not contaminated by groundwater baseflow.

In addition to visual observations, DOE will carry out water quality monitoring to determine the effectiveness of the action. Two-times per week, DOE will use a multi-parameter probe to collect field samples (pH, SC, and temperature) and a Hach field test kit or a Yellow Springs Instruments (YSI) multiprobe to test for ammonia (as N). Once a week, DOE will collect a sample for laboratory analysis. Samples will also be collected when a significant change to discharge volume is made or the pump discharge laterals or points are moved.

DOE will submit a water quality monitoring plan to the Subcommittee for review and comment. The plan will also identify sampling locations and depths. FWS requested that visual monitoring be conducted to observe and record any fish mortality in the backwater areas during the project. Weekly email status reports will be submitted to FWS and the Subcommittee. A seasonal report will be prepared by DOE and, after comment by the Subcommittee, will be posted on DEQ's website.

DOE made it clear in the meeting that the freshwater application project is experimental, and that the goal of the project is not to achieve compliance with water quality standards in the backwater habitat areas, but to determine if freshwater application is a feasible means to control water quality conditions in the backwater habitat. It was also agreed that if the project was found to be a feasible means of controlling water quality conditions in the backwater areas, that the system may need to be operated for more than the 3 years outlined currently by DOE.

DOE Planned Interim Remediation Action (Groundwater Pump & Treat)

Don Metzler and Ken Karp outlined the planned Interim Remediation Action, a plan to pump and treat ammonia contaminated groundwater. DOE outlined how the highest ammonia concentrations seen in groundwater at the site appear to be found deep in the aquifer, immediately above the freshwater brine interface. In turn, DOE offered 2 conceptual approaches to clean up the contaminated groundwater via a pump and treat system, including: 1) install shallow groundwater pumping wells to intercept the shallow reaches of the contaminant plume that directly impact the river's backwater habitat, or 2) install shallow and deep pumping wells to intercept all vertical zones of groundwater contamination before they reach the river. During the meeting, DOE expressed its preference for the first option, in that this approach would be less expensive and allow efforts to be focused on protecting the river's backwater habitat. However, it was also noted that the first option would not prevent the deeper and apparently more contaminated part of the groundwater plume from discharging to the river. DOE staff argued that these deeper zones of groundwater pollution could rise and discharge to the central portion of the river's channel where dilution is greatest. However, DOE also indicated that the scope of approach #2 is likely prohibitive both from the standpoints of cost and required scale of operations.

DOE then outlined its interim groundwater remediation pump and treat program. Phase I design of the plan includes 6 wells between the pile and river, capturing 30 gpm. Pumped groundwater will be sprayed over the evaporation pond to maximize evaporation. DOE expects to complete the design of this system by September. Related field work is complete, data reduction is underway, and a report is in preparation.

A critical aspect of this pumping system is to understand the brine (80,000 to 100,000 ppm TDS) that underlies the freshwater zone. Pump tests and field work for this project was finished on March 13, 2002. Testing to date indicates that the freshwater wedge is thicker to the north on the site, as a result of a drop in elevation of the freshwater/brine interface in the subsurface seen between 3 monitoring well nests at the site. In the nested wells found near the river at SMI-PW-01 and SMI-PW-02, the brine interface was found at a depth of about 50 to 55 feet below ground surface (bgs), respectively. In the millsite area in the nested wells at SMI-PW-03, the interface was found at a greater depth, about 80 feet bgs.

It will be critical to determine the pumping rate that can be sustained without any rise in the underlying freshwater/brine interface. This cannot be specifically answered with the

existing well configuration. Phase 2 of the design effort will include rehabilitating a well for testing (or constructing a new test well) to develop the final design.

As noted above, funding is available to complete the design (but not implementation) of the Interim Remediation Plan. DOE pointed out that: 1) the pond to handle pumped groundwater may cost up to \$1M; 2) for operation and maintenance reasons, it may be advantageous to construct 2 smaller and separate evaporation ponds rather than 1 large evaporation pond; and 3) DOE contractor's are still in process of determining the size of the evaporation pond(s) needed for this project and other wastewater treatment needs at the facility. The FY2004 request includes funding for construction of a single large pond.

Information was also provided to DOE during the meeting that indicates upward vertical hydraulic gradients are apparent in the nested wells near the river at SMI-PW-01 and SMI-PW02. In contrast, slightly downward hydraulic gradients are apparent at the mill site in SMI-PW-03. These observations were based on freshwater equivalent head calculations made from groundwater head fluid density measurements reported in the April, 2001 Shepherd-Miller, Inc. (SMI) Report. An observation was made that the apparent downward hydraulic gradient near SMI-PW-03 may explain why deeper groundwater under the mill site area exhibited higher sulfate/chloride ratios, versus the lower sulfate/chloride ratios seen in groundwater near SMI-PW-01 and SMI-PW-02.

DOE Long-term Groundwater Remediation Strategy

Don Metzler and Ken Karp then described the status of DOE's long-term groundwater remediation strategy for the site. DOE plans to use the UMTRA PEIS framework to develop a long-term remediation strategy to meet EPA groundwater standards. Compliance strategies can include no further remediation, natural flushing, active remediation, or a combination of these strategies. Contaminants of Potential Concern (COPC) are identified in a Remedial Action Plan. DOE staff acknowledged that additional contaminants, other than those in 40 CFR 192, Table 1 and Table A, can be examined in the groundwater cleanup of the site. For these other contaminants, DOE would conduct a risk assessment analysis to determine appropriate cleanup standards. In turn, these cleanup standards could be based on a human health basis or an environmental protection basis (e.g., surface water quality standards).

It was pointed out at the meeting that SRK filtered all field samples. Therefore, a major problem exists with respect to organics data in groundwater at the site. However, DOE pointed out that organics have not been a major concern at other sites, and that 1 sample of volatile organic contaminants (VOCs) was collected from well ATP-2S in March, 2002. DOE will reassess the SRK data, develop an organics sampling plan, and collect new samples of the shallow groundwater and tailings pore water. DOE will add organics and other Appendix IX constituents to the data collection objectives for the next Moab Sampling and Analyses Work Order. DOE will also attempt to move the sampling data up a few weeks (to late May). DOE does not plan to carry out a separate organics study. This Sampling and Analyses Plan Work Order will be submitted to the Subcommittee for review and comment.

Results of the VOC monitoring in well ATP-2S will soon be available and provided to Subcommittee members in an upcoming DOE-GJO Moab Mill Site Data Validation Report. During the meeting, DOE handed out a 4/11/02 Data Validation Report for the December, 2001 Water Sampling at the site.

DOE is currently carrying out a sensitivity/uncertainty analysis of the long-term groundwater modeling assessment that SMI carried out for the Trust and a groundwater modeling analysis conducted by the Southwest Research Center (SWRC). These two models differ in that SWRC model assumed little bedrock recharge occurs of the Quaternary-age alluvial (Qal) aquifer from the Jurassic-age Glen Canyon Group (Jgc), and instead assumed more aquifer recharge from a horizontal source in the Qal units and direct meteoric precipitation on the land surface. In contrast, the SMI model assumed a large amount of bedrock groundwater recharge from the Jgc Formations, and little recharge from either Qal formation (horizontal) or direct precipitation.

At this point in time, DOE concurs with SMI's conclusion that in terms of a groundwater remediation strategy, the same strategy applies regardless of whether the cap-in-place or relocation alternative is selected. This strategy presently includes a combination of active groundwater pumping and treatment for ammonia and retarded COPC's (35 years), and natural flushing for the more mobile COPC's (65 years). Groundwater will meet MCL's, ACL's, or background within 100 years and be protective of human health and the environment. However, DOE noted that MacTech staff has discovered that there is currently not sufficient data to calibrate the groundwater flow portion of the SMI model. In particular, additional data is needed on the amount of subsurface groundwater recharge from the bedrock formations (i.e., the Jgc Formations beneath the site). DOE was informed during the meeting that this shortcoming in the SMI groundwater flow model: (1) makes it difficult to calibrate the contaminant transport portion of the model, and (2) casts doubts on the SMI predictions that local groundwater can be cleaned up in less than 100 years (without active treatment).

In an attempt to solve this data gap, DOE will provide a workplan for the installation of some nested monitoring wells to be completed in bedrock along the Northern margin of the millsite. The purpose of these nested wells will be to determine the amount of groundwater recharge coming from the Jgc Formations into the Qal aquifer under the site. DOE concluded in the meeting that in the event that these bedrock wells show little recharge comes from Jgc Formations, that DOE will pursue Supplemental Standards in its cleanup plan for the site.

The Plan for Remediation will outline a long-term groundwater remediation strategy for the site. This strategy will also address resaturation of the pile by the Colorado River. At this point in time, the preliminary strategy includes a slurry wall with groundwater extraction at 45 gpm for 35 years (in the ammonia plume area) and a distillation treatment system, treatment of uranium (in the uranium plume area) and other COPC's with 10 gpm extraction for 35 years, and then natural flushing for the remainder of the period.

DOE will continue to evaluate uncertainties in model predictions through sensitivity analysis, identifying data gaps to improve the conceptual model and reduce uncertainties, collecting additional data, updating the site conceptual groundwater model, and revising the groundwater compliance strategy in the Plan for Remediation as necessary. By mid-May, DOE will submit a letter report on this topic (including the identification of data gaps) to the Subcommittee for review and comment.

DOE emphasized that it will be working toward reducing uncertainties with respect to the long-term groundwater cleanup strategy. This will be accomplished by continuing to review existing data and historical characterization documents, implementing additional DOE data collection directed towards filling data gaps, revising the conceptual model as determined necessary, and updating the remedial timeframe and associated cost estimates as determined necessary. However, DOE will not have a detailed long-term groundwater cleanup compliance strategy for the Plan for Remediation. The strategy will continue to remain conceptual until all data quality objectives are identified and met.

Use of Escrow Funds

Based on funds that were remaining in the Trust and forthcoming Title X funds, approximately \$500K will soon reside in an escrow account for use on the site. To this point in time, \$4.5K has been allocated to the Utah Division of Wildlife Resources (Mike Hudson) to carry out a fishery study related to the Initial Remediation Action. Other possible uses of escrow funds include:

- Additional borehole data at the Klondike Flats site (following initial DOE review of existing geologic data available in the literature);
- Vegetation studies in the Klondike Flats area (to determine if a stand of native plants can survive and thrive on soils derived from the Mancos Shale Formation);
- Studies of the potential for river migration;
- Geologic investigation of faulting (i.e., further assessing the capable fault question); and
- Studies of other failure scenarios (e.g., differential settlement)

After considerable discussion, it was decided that none of the topics above warranted the expenditure of escrow funds at this time; however, the letter report relating to long-term groundwater remediation, referenced above, will likely identify data gaps; the use of escrow funds to address these data gaps should be considered at that time.

Other Issues

DOE also plans to develop work plans in the near future for a new bedrock well and further subsoil/subpile characterization (both in the pile and at the toe of the pile).

The addition of new members to the Subcommittee (e.g., USGS, COE, and BLM) was discussed briefly. It was decided that the current make-up of the Subcommittee is adequate to address issues presently facing the Subcommittee, and as such, no additional members are recommended at this point in time. However, it was recommended that Helen Dawson (EPA-Region 8) be included on all Subcommittee announcements and agendas.

Action Items

Based on this meeting, the following action items were agreed to:

1. DOE will prepare an addendum to the Initial Remediation Action Implementation Plan to include a water quality sampling plan and modifications to the reporting plan. DOE will forward the sampling plan to the Subcommittee for review and comment on or about April 23, 2002.
2. DOE will issue a press release describing the Initial Remediation Action.
3. With respect to the Interim Remediation Action, DOE will continue to carry out associated investigations, complete a final design in September, 2002, and submit a Draft Implementation Plan to the Subcommittee by November, 2002.
4. With respect to organics in the pile, DOE will develop a Sampling and Analysis Plan Work Order that address organics sampling (including the number of wells and parameters to be sampled), and by the end of May, DOE will submit this work order to the Subcommittee for review and comment. This will require quick Subcommittee turn-around in that the next scheduled DOE sampling event will be June, 2002.
5. DOE will continue its sensitivity and uncertainty analysis of SMI's groundwater model for the site and by mid-May will submit a letter report (including, among other things, the identification of data gaps) to the Subcommittee (and Helen Dawson, EPA-Region 8) for review and comment; DOE will identify a specific date for submission of comments from the Subcommittee.
6. As soon as drafts are prepared, DOE will submit a bedrock well workplan and a subsoil/subpile characterization workplan to the Subcommittee for review and comment. (Both of these workplans will be abbreviated in nature.)
7. After the May 2 meeting with Jessie Roberson of DOE-Headquarters, DOE will prepare a report describing the administrative process for remediation of the Moab Millsite as soon as possible. This report will be shared with the general Stakeholders and the Subcommittee.

Next Meeting

The next meeting of the Subcommittee will be held in June or July in Moab, UT; a final date has not yet been established. (The proposed June 6th date, identified at the meeting in Grand Junction, resulted in scheduling conflicts.) Agenda items will include, among other topics, a project status report from DOE, discussion of the NAS report, review of the letter report referenced in Action Item #5 above, and a field trip to observe implementation of the Initial Remediation Action.